10 11. (Amended) A composite material comprising a porous body portion comprising a mixed conducting oxide of claim 1, and a film portion including a dense continuous layer of a mixed conducting oxide formed on said porous body portion, wherein the sintering temperature for the oxide material of said porous body portion is higher than that for the oxide material of said film portion.

11 12. (Amended) A material according to claim 10, wherein the porosity of said porous body portion is within the range of 20% to 80%, and the thickness of said dense continuous layer is within the range of 10 μm to 1mm.

13. (Amended) A composite material comprising a porous body portion comprising a mixed conducting oxide of claim 1, and a film portion including a dense continuous layer of a mixed conducting oxide formed on said porous body portion, wherein the maximum heat treatment temperature for the oxide material of said porous body portion is higher than that for the oxide material of said dense continuous layer, and

said porous body portion comprises a ceramic composition of perovskite structure, said composition being of general formula (1)

$$\{Ln_{1-a}A_a\}\{B_xB'_yB''_z\}\ O_{(3-\delta)} \qquad (1)$$

where Ln represents one or a combination of elements selected from the group of Y and lanthanoids;

A represents one or a combination of elements selected from the group of Ba, Sr, and Ca;

B represents one or a combination of elements selected from the group of Co, Fe, Cr, and Ga, B always containing Fe or Co, the sum of the molar numbers of Cr and Ga being within the range of 0% to 20% of the total molar number x of B;

B' represents one or a combination of elements selected from the group of Nb, Ta, Ti, and Zr, B' always containing Nb or Ta, the sum of the molar numbers of Ti and Zr being within the range of 0% to 20% of the total molar number y and B';

B″ represents one or a combination of elements selected from the group of Cu, Ni, Zn, Li, and Mg;

$0.8 \leq a \leq 1$; $0 < x$; $0 < y \leq 0.5$; $0 \leq z \leq 0.2$

$0.98 \leq x + y + z \leq 1.02$; and

δ represents a value which is so determined as to meet charge neutralization conditions.

14. (Amended) A composite material comprising a porous body portion comprising a mixed conducting oxide, and a film portion including a dense continuous layer of a mixed conducting oxide formed on said porous body portion, wherein the maximum heat treatment temperature for said oxide material of said porous body portion is higher than that for said oxide material of said dense continuous layer, and

said porous body portion comprises a ceramic composition of perovskite structure, said composition being of general formula (1)

$$\{Ln_{1-a}A_a\}\ \{B_xB'_yB''_z\}\ O_{(3-\delta)} \qquad (1)$$

where Ln represents one or a combination of elements selected from the group of Y and lanthanoids;

A represents one or a combination of elements selected from the group of Ba, Sr, and Ca;

B represents one or a combination of elements selected from the group of Co, Fe, Cr, and Ga, B always containing Fe, the molar number of Co being within the range of 0% to 10% of the total molar number of Fe, the sum of the molar numbers of Cr and Ga being within the range of 0% to 20% of the total molar number x of B;

B' represents one or a combination of elements selected from the group of Nb, Ta, Ti, and Zr, B' always containing Nb or Ta, the sum of the molar numbers of Ti and Zr being within the range of 0% to 20% of the total molar number y and B';

B″ represents one or a combination of elements selected from the group of Zn, Li, and Mg;

$0.8 \leq a \leq 1$; $0 < x$; $0 < y \leq 0.5$; $0 \leq z \leq 0.2$

$0.98 \leq x + y + z \leq 1.02$; and

δ represents a value which is so determined as to meet charge neutralization conditions.

16. (Amended) A composite material with a porous body portion comprising a mixed conducting oxide, and a film portion including a gastight dense continuous layer of a mixed conducting oxide formed on said porous body portion, wherein said mixed conducting oxide of said porous body portion is expressed by general formula (2)

$$AFe_xO_{(3-\delta)} \qquad (2)$$

where $0.98 \leq X \leq 1.02$; A represents one or a combination of elements selected from the group of Ba, Sr, and Ca; and δ represents a value which is so determined as to meet charge neutralization conditions and said mixed conducting oxide of said dense continuous layer is of general formula (3)

$$\{Ln_{1-a}A_a\}\ \{B_xB'_y\}\ O_{(3-\delta)} \qquad (3)$$

where Ln represents one or a combination of elements selected from the group of Y and lanthanoids;

A2 cont

A represents one or a combination of elements selected from the group of Ba, Sr, and Ca;

B represents one or a combination of elements selected from the group of Fe and Co;

B' represents one or a combination of elements selected from the group of Cu, Ni, Zn, Li, and Mg;

$0.8 \leq a \leq 1$; $0 < x$; $0 \leq y \leq 0.2$;

$0.98 \leq x + y \leq 1.02$; and

δ represents a value which is so determined as to meet charge neutralization conditions.

24 ~~28~~. (Amended) A composite material with a dense continuous layer comprising a mixed conducting oxide in perovskite structure, said composition being expressed by the following general formula (1)

A3

$$\{Ln_{1-a}A_a\}\ \{B_xB'_yB''_z\}\ O_{(3-\delta)} \qquad (1)$$

where Ln represents one or a combination of elements selected from the group of Y and lanthanoids;

A represents one or a combination of elements selected from the group of Ba, Sr, and Ca;

B represents one or a combination of elements selected from the group of Co, Fe, Cr, and Ga, B always containing Fe or Co, the sum of the molar numbers of Cr and Ga being within the range of 0% to 20% of the total molar number x of B;

B' represents one or a combination of elements selected from the group of Nb, Ta, Ti, and Zr, B' always containing Nb or Ta, the sum of the molar numbers of Ti and Zr being within the range of 0% to 20% of the total molar number y and B';

B″ represents one or a combination of elements selected from the group of Cu, Ni, Zn, Li, and Mg;

A

$0.8 \leq a \leq 1$; $0 < x$; $0 < y \leq 0.5$; $0 \leq z \leq 0.2$

$0.98 \leq x + y + z \leq 1.02$; and

δ represents a value which is so determined as to meet charge neutralization conditions; and

a porous body portion comprising a mixed conducting oxide, said porous body portion is expressed by general formula (2):

A3 Cont.

$$AFe_xO_{(3-\delta)} \qquad (2)$$

where $0.98 \leq X \leq 1.02$; A represents one or a combination of elements selected from the group of Ba, Sr, and Ca; and δ represents a value which is so determined as to meet charge neutralization conditions.

29 33. (Amended) A material according to claim 12, wherein said dense continuous layer is made of a ceramic of a mixed conducting oxide having its composition expressed by the following general formula (7):

$$A\{Co_xFe_yB_z\}O_{(3-\delta)} \qquad (7)$$

where A represents one or a combination of elements selected from the group of Ba, Sr, and Ca; B represents one or a combination of elements selected from the group of Nb and Ta; $0 \leq x$; $0 \leq y$; $0 < z \leq 0.2$; $0.98 \leq x + y + z \leq 1.02$; and δ represents a value which is so determined as to meet charge neutralization conditions.

A4

30 34. (Amended) A material according to claim 12, wherein said dense continuous layer is made of a ceramic of a mixed conducting oxide having its composition expressed by the following general formula (8):

$$A\{Co_xFe_yB_zB'_{z'}\}O_{(3-\delta)} \qquad (8)$$

where A represents one or a combination of elements selected from the group of Ba, Sr, and Ca; B represents one or a combination of elements selected from the group of Nb and Ta; B' represents one or a combination of elements selected from the group of Cu, Ni, and Zn; $0 \leq x$; $0 \leq y$; $0 < z \leq 0.2$; $0 \leq z' \leq 0.2$; $0.98 \leq x + y + z + z' \leq 1.02$; and δ represents a value which is so determined as to meet charge neutralization conditions.

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~~35. (Amended) A composite material wherein an oxygen exchange layer is formed on a~~

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surface of one or either side of an oxide having oxide ion diffusivity and porosity from 20% to 80%, said oxygen exchange layer being made of an oxide of different oxide composition than said oxide having oxide ion diffusivity.

34. (Amended) A material according to claim 3, 4 or 14, wherein an oxygen exchange layer is formed on a surface of one or either side of said dense continuous layer, said oxygen exchange layer being made of an oxide of different composition than the oxide forming said dense continuous layer.

35. (Amended) A material according of claims 3, 4 or 14, wherein the porosity of said porous body portion is within the range of 20% to 80%, and the thickness of said dense continuous layer is within the range of 10 μm to 1mm.

41. (Amended) A method of making a composite material for the separation of oxygen from a mixed gas, comprising: providing a porous body portion comprising a mixed conducting oxide; and providing a film portion including a gastight dense continuous layer of a mixed conducting oxide formed on said porous body portion, wherein the maximum heat treatment temperature for said mixed conducting oxide of porous body portion is includes sintering at a higher maximum temperature than that of said dense continuous layer.

42. (Amended) A method of making a composite material for use as a chemical reactor, comprising: providing a porous body portion comprising a mixed conducting oxide; and providing a film portion including a gastight dense continuous layer of a mixed conducting oxide formed on said porous body portion, wherein the maximum heat treatment temperature for said mixed conducting oxide of porous body portion includes sintering at a higher maximum temperature than that of said dense continuous layer.

REMARKS

Reconsideration of claims 1-8, 10-14, 16, 17, 19-20 and 22-42 is respectfully requested. Claims 9, 15, 18 and 21 are canceled. Claims 10-14, 16, 28, 33-35 and 39-42 are amended. An amended Abstract is attached hereto on a separate sheet.

Rejection of claims 9-12 under 35 U.S.C. § 112, first paragraph is respectively traversed